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(54) DATA TRANSMITTING METHOD, DATA RECEIVING METHOD, VIDEO DATA TRANSMITTING DEVICE, VIDEO DATA RECEIVING DEVICE, VIDEO SIGNAL TRANSMISSION AND RECEPTION SYSTEM, AND PROGRAM

(57)Abstract:
PROBLEM TO BE SOLVED: To improve an error rate by decreasing errors in additional data reception and simplifying circuit constitution.
SOLUTION: This is a video signal transmission and reception system which transmits a digital video signal from a transmission part 30 to a reception part 50 by using a line 9 as a transmission line; and the transmission part 30 converts the video signal to be sent into a bit sequence longer than the data length of pixels constituting the video

signal, allocating bit sequences in a blanking period wherein the data of pixels of the bit sequence are not transmitted, and transmitting the same superposed data repeatedly by using the bit sequences and the reception part 50 extracts a specific bit sequence indicating the blanking period from received data and makes a majority decision on the demodulation result of the extracted bit sequence to determine output data.

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CLAIMS

[Claim(s)]

[Claim 1] The data-transmission approach characterized by to carry out multiple-times transmission of the same superposition data using two or more of said bit strings which assign two or more bit strings to the blanking period when it is the data-transmission approach using the interface for digital display connection at, the video signal which should be transmitted is changed into a bit string longer than the data length of the pixel which constitutes the video signal concerned at, and said video signal in said changed bit string is not transmitted, and are assigned to one or more transmission lines.

[Claim 2] Said superposition data transmitted are the data transmission approach according to claim 1 characterized by being transmitted using two or more codes which show said blanking period.

[Claim 3] Said superposition data transmitted are the data transmission approach according to claim 1 characterized by being an audio signal.
[Claim 4] The data receiving approach which is connected to the interface for digital display connection, receives a digital video signal including the blanking period expressed by two or more kinds of bit strings, extracts the specific bit string which shows said blanking period from said received digital video signal, and is characterized by performing majority to the result to which the extracted bit string restored, and determining output data.
[Claim 5] The video-data sending set characterized by having an input means to input the superposition data added to the video data which should be transmitted, and the video data concerned, and a coding means to encode including said same superposition data to two or more bit strings assigned at a video blanking period while changing into serial data said video data inputted by said input means.
[Claim 6] Said input means inputs R, G, B or Y, R-Y, and the video data of B-Y and the audio data which are said superposition data. Said coding means The video data of R, G, B or Y, R-Y, and B-Y which were inputted by said input means is assigned to a code longer than the bit length of the video data concerned. R, G, B or Y, R-Y, and B-Y each Said same audio data are included to two or more codes which change corresponding to an independent channel and are assigned at said video blanking period of each channel, The video-data sending set according to claim 5 by which it is characterized.
[Claim 7] A receiving means to receive a digital video signal including the blanking period which is connected to the interface for digital display connection, and is expressed by two or more kinds of bit strings, A bit string extract means to extract the specific bit string which shows said blanking period from said digital video signal received by said receiving means, The video signal receiving set characterized by including a recovery means to restore to the bit string extracted by said bit string extract means, and an output-data decision means by which majority determines output data from the result to which it restored with said recovery means.
[Claim 8] Said output-data decision means is a video signal receiving set according to claim 7 characterized by for the Hamming distance of the bit string assigned to each symbol as what shows said blanking period, and the bit string received by said receiving means choosing the shortest bit string, and determining output data.
[Claim 9] Said output-data decision means is a video signal receiving set according to claim 8 characterized by determining output data based on the probability for the bit string said whose Hamming distance is the shortest to be an error.
[Claim 10] the blanking period which is the video signal receiving set connected to the interface for digital display connection, and is expressed by two or more kinds of bit strings -- receiving -- the bit string of the same class -- two or more times -- more than -- two or more times from said digital video signal received by receiving means receive the digital video signal sent, and said receiving means -- more than -- the

video signal receiving set characterized by to include an audio data-output means output audio data, based on said same kind sent of bit string.
[Claim 11] It is the video signal transceiver system which transmits a digital video signal from a transmitting side to a receiving side using one or more transmission lines. Said transmitting side The video signal which should be transmitted is changed into a bit string longer than the data length of the pixel which constitutes the video signal concerned. Two or more bit strings are assigned to the blanking period when the data of the pixel concerned in the bit string concerned are not transmitted. Multiple-times transmission of the same superposition data is carried out using two or more bit strings concerned. Said receiving side The video signal transceiver system characterized by performing majority to the result to which the specific bit string which shows said blanking period was extracted, and the extracted bit string recovered it from the received data, and determining output data.
[Claim 12] As opposed to the computer which changes the video signal which should be transmitted using the interface for digital display connection into a bit string longer than the data length of the pixel which constitutes the video signal concerned, and makes data transmission possible The means which assigns two or more bit strings to the blanking period when said video signal in said changed bit string is not transmitted, The program for operating the computer concerned as a thing equipped with the means which carries out multiple-times transmission of the same superposition data using said two or more bit strings assigned to one or more transmission lines.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the transmission approach of a digital video signal etc., and relates to the transmission approach of transmitting a control signal and addition data to the blanking period of a digital video signal etc., in more detail.
[0002]
[Description of the Prior Art] When transmitting a video signal to the former, for example, a liquid crystal display monitor, and CRT, what uses the analog RGB interface and carries out the analog transmission of the video signal was in use. However, the number of pixels which can be displayed in a liquid crystal display monitor is decided beforehand, for example, and digital transmission has attracted attention with the spread of this liquid crystal display monitor. Moreover, in order to make a refresh rate high in order to decrease a flicker, or to display an image on a

larger screen, it is required that data should be sent at high speed, and in the conventional analog transmission, since a transmission strain is large and it is easy to generate a ghost, the importance of the digital transmission accompanying high-definition-izing has been increasing.

[0003] DVI (Digital Visual Interface) attracts attention with the demand of this digital transmission in recent years. This DVI is the interface for digital display connection defined by DDWG (Digital Display Working Group), and has transmitted data using two or more DCHs based on a TMDS (Transition Minimized Differential Signaling) technique. If the digital transmission approach using DVI is used, it will become possible to offer cheaply a high definition video data with few transmission strains by digital transmission.

[0004]

[Problem(s) to be Solved by the Invention] Thus, compared with an analog transmission, a high definition screen can be got by adopting DVI. Moreover, in DVI, the blanking period which can transmit other data in addition to the period which transmits the pixel data of RGB (Red, Green, Blue) exists. It is also possible to transmit an audio signal etc., using this blanking period.

[0005] Here, when transmitting a digital video signal, transmission errors, such as bit transformation, may arise, but in the case of a video signal, even if a transmission error arises, a screen top is seldom conspicuous and does not pose a big problem. However, when a transmission error arises for example, in the midst which is transmitting the audio signal, a noise and an allophone may come out and it is necessary to consider an error rate more severely than the case where a video signal is transmitted. Namely, it is separate and necessary for [when transmitting the data with which the error of those other than a video signal is conspicuous using the blanking period of DVI etc.] for the processing for error detection and an error correction. Since much hardware was generally needed for processing for this error detection and an error correction, equipment was enlarged and leading to a cost rise had become a problem.

[0006] The place which it is made in order that this invention may solve such a technical technical problem, and is made into the purpose is to offer the data transmission approach that the error of addition data reception can be reduced etc. Moreover, other purposes are shown in simplifying circuitry and aiming at an improvement of an error rate.

[0007]

[Means for Solving the Problem] The basis of this purpose and this invention repeat and superimpose data on the blanking period of a digital video signal by the sending area in the system which transmits a control signal and addition data, by the receiving side, are performing a majority judging and are characterized by aiming at reduction of an error rate. That is, this invention is characterized by to carry out multiple-times transmission of the same superposition data using two or more bit strings which

assign two or more bit strings to the blanking period when it is the data transmission approach which used the interface for digital display connection at, the video signal which should be transmitted is changed into a bit string longer than the data length of the pixel which constitutes this video signal at, and the video signal in the changed bit string is not transmitted, and are assigned to one or more transmission lines.

[0008] Here, the superposition data transmitted have the semantics of the data added to the video data transmitted, and can be characterized by being transmitted using two or more codes which show a blanking period. Furthermore, this superposition data is desirable at the point that an error can be reduced and transmitted to the audio signal to which an error is conspicuous in general in it being an audio signal unlike the description, then a video data.

[0009] It connects with the interface for digital display connection, the data receiving approach that on the other hand this invention is applied receives a digital video signal including the blanking period expressed by two or more kinds of bit strings, extracts the specific bit string which shows a blanking period from this digital video signal, can perform majority to the result to which the extracted bit string restored, and can be characterized by determining output data.

[0010] Moreover, the video-data sending set with which this invention is applied is characterized by to have an input means input the video data and superposition data, such as audio data, which consist of R, G and B (Red, Green, Blue) which should be transmitted or brightness Y, color-difference R-Y, and B-Y, and a coding means encode including the same superposition data to two or more bit strings which change the inputted video data into serial data, and are assigned at a video blanking period.

[0011] On the other hand, the video signal receiving set with which this invention is applied For example, a receiving means to receive a digital video signal including the blanking period which is connected to DVI and expressed by two or more kinds of bit strings, It is characterized by including a bit string extract means to extract the specific bit string which shows a blanking period from the received digital video signal, a recovery means to restore to the extracted bit string, and an output-data decision means by which majority determines output data from the result to which it restored. As this majority, the number of "1" and "0" restored to which and obtained is compared, and the direction with much number can be considered as a bit output, for example.

[0012] When a good result is not obtained [the Hamming distance of the bit string assigned to each symbol as that an output-data decision means indicates a blanking period to be here, and the bit string received by the receiving means choosing the shortest bit string, and determining output data, and] only by the description, then the simple majority, it becomes possible to interpolate majority. Moreover, it is desirable at the point that it becomes possible to take into consideration by weighting in what kind of probability a near condition generates determining output data based on the probability for the bit string this Hamming distance of whose is the shortest to

be an error on the description, then transmission, and an error rate can be reduced more.

[0013] the blanking period when ****** and the video signal receiving set with which this invention is applied are expressed by two or more kinds of bit strings from other viewpoints -- receiving -- the bit string of the same class -- two or more times -- more than -- a receiving means to receive the digital video signal sent, and two or more times from the received digital video signal -- more than -- it is characterized by to include an audio data output means to output audio data, based on the bit string of the same class sent.

[0014] Furthermore, the program to which this invention is applied receives the computer which changes the video signal which should be transmitted by DVI into a bit string longer than the data length of the pixel which constitutes this video signal, and makes data transmission possible. The means which assigns two or more bit strings to the blanking period when the video signal in the changed bit string is not transmitted, This computer shall be operated as a thing equipped with the means which carries out multiple-times transmission of the same superposition data using two or more bit strings assigned to one or more transmission lines. In addition, the case where it is provided from program transmission equipment as the offer approach of this program through networks, such as the Internet besides in the case of being provided by media, such as CD-ROM, for example can be considered.

[0015]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail based on the gestalt of operation shown in an accompanying drawing. Drawing 1 is drawing having shown an example of the digital video signal transceiver system by which the gestalt of this operation is applied. Here, it is large, and has the digital tuner 10 which is the transmitting side (transmitter) of a digital video signal, and the monitor 20 which is the receiving side (receiver) of a digital video signal, and the digital tuner 10 and the monitor 20 are connected by Rhine 9 which supports DVI (Digital Visual Interface) which is an interface for digital display connection.

[0016] The antenna 8 received the electric wave of the high frequency by which compressed digital data, such as an image and voice, were modulated, and the digital tuner 10 is equipped with the front end 11 which outputs digital data which solved the modulation and were compressed, such as an image and voice. The output from this front end 11 is decrypted by the AV (Audio Visual) decoder 12, is passed to the transmitting section 30, and is outputted through Rhine 9 as a digital video signal.

[0017] The digital component video signal sent to a monitor 20 through Rhine 9 is inputted and decoded by the receive section 50. The pixel data of decoded RGB are changed into an analog signal by D/A converter 21, and are amplified by amplifier (RGB AMP) 22. Moreover, by level Vertical Synchronizing signal (H/V SYNC) 23 acquired by the receive section 50, a synchronization is taken and the output from amplifier 22 is displayed on CRT24. On the other hand, the audio signal obtained in

the receive section 50 is changed into an analog signal by D/A converter 25, and a voice output is carried out by the loudspeaker 26 with it.

[0018] Drawing 2 is drawing for explaining the configuration of the transmitting section 30. The transmitting section 30 to which the gestalt of this operation is applied is outputting the digital signal applied to DVI to a receive section 50 through Rhine 9. In this transmitting section 30, a code longer than that bit length is assigned, and the RGB video data is changed and transmitted to serial data. Moreover, using a blanking period, the superposition data which are addition data, such as audio data, are transmitted, and the superposition data has the description in the point that the same data are sent repeatedly.

[0019] The transmitting section 30 is equipped with the timing generation section 35 which generates the timing for outputting superposition data in response to the buffer 34, blanking signal, and pixel clock which input superposition data which change the inputted pixel data of RGB which is 8 bits respectively into 10-bit serial data, such as encoders 31, 32, and 33 and audio data, and store this superposition data temporarily according to timing as a concrete configuration. Moreover, it has PLL (Phase-Locked Loop)36 which changes into a 10-bit serial clock the pixel clock which consists of 8 bits of parallel, and DDC (Display Data Channel)37 which transmit and receive what kind of capacity the inquiry [to a monitor 20]-frequency which can be synchronized, and monitor 20 side is supporting. The superposition data (2 bits and 1 bit) outputted from a buffer 34 are changed into 10-bit serial data at a blanking period (video blanking period), and are outputted to a receiving side. CTL3 inputted into an encoder 31 can include the information about control of a monitor 20. Moreover, the signal of a horizontal synchronization (HSYNC) and a vertical synchronization (VSYNC) is inputted into an encoder 33. In addition, R-Y which is Y which is brightness instead of and the color difference, and the video data which consists of B-Y may be inputted.

[the pixel data of RGB]

[0020] Drawing 3 (a) and (b) are drawings for explaining DVI transmission timing. Drawing 3 (a) shows the transmission timing before going into encoders 31, 32, and 33, and drawing 3 (b) shows the DVI transmission timing outputted from encoders 31, 32, and 33. As shown in drawing 3 (a), a video blanking period (Blanking) is established following the data of three channels of 8 bits each of RGB. As shown in drawing 3 (b), the output from an encoder 31, an encoder 32, and an encoder 33 is changed into 10 bits, and constitutes three independent channels, a channel 2, a channel 1, and a channel 0, respectively. That is, the pixel data of R, G, and B are transmitted by the independent channels 0-2, form 1 pixel and are transmitted by 10 bits. A video blanking period can transmit other data other than pixel data using CTL0/CTL[besides a horizontal synchronization (HSYNC) and a vertical synchronization (VSYNC)]1/CTL2/CTL3.

[0021] Drawing 4 is drawing for explaining assignment of the code in the gestalt of this operation. It is possible to assign four codes at a video blanking period, and if it is

which the code, it can judge with a video blanking period. In drawing 4 , the 10-bit CTRL code is assigned as four codes of codes S0-S3 to (0, 0) of (bit1 and bit0), (0, 1), (1, 0), and (1, 1), respectively. These four codes can be used, and a total of 2-bit 6-bit information can be transmitted per pixel clock and by each channel, among these 4 bits of CTL0-CTL3 except a horizontal synchronization (HSYNC) and a vertical synchronization (VSYNC) are usable to transmission of superposition data. Moreover, with the gestalt of this operation, when sending superposition data using a blanking period, to three in four, CTL0-CTL3, it constitutes so that the same superposition data may be sent repeatedly, and 1 bit of superposition data is sent by the triplet of CTL0-CTL2. At this time, the buffer 34 shown in drawing 2 can be used, and data [****] can be sent in time. moreover, repeat data -- every channel -- every [a fixed clock] -- you may shift and transmit. Thus, it becomes possible by repeating and sending the same superposition data to reduce the error of addition data reception.

[0022] Drawing 5 is drawing for explaining the configuration of a receive section 50 shown in drawing 1 . The receive section 50 where the gestalt of this operation is applied The 10-bit serial data outputted from the transmitting section 30 That it is a blanking period when four codes assigned at the decoders 51, 52, and 53 to which it restores to the pixel data of RGB which is 8 bits respectively, and a blanking period are inputted (blanking signal) by the blanking signal generation section 54 and each channel to output It has the buffer 56 for restoring and outputting the timing at the time of transmission to the majority processing section 55 which inputs the result to which these four codes restored, and finally determines superposition data, for example, audio data. Moreover, it has the timing generation section 58 which generates the timing for outputting superposition data based on PLL57 changed into the pixel clock which consists of 8 bits of the parallel stabilized while generating the 10-bit serial clock from the transmitted clock, and the pixel clock from this PLL57. Furthermore, it has EDID (ExtendedDisplay Identification Data)59 which transmits the capacity by the side of a monitor 20 to the digital tuner 10 side which is a host. While being controlled based on the blanking signal outputted from the blanking signal generation section 54 not to actually output the pixel data of RGB to a blanking period, superposition data are outputted based on this blanking signal.

[0023] Drawing 6 is a timing chart for explaining decision by the receive section 50 to the data of 10 bit strings sent. Here, corresponding to a pixel clock, pixel data and superposition data are received in order. In the blanking signal generation section 54, the bit string which shows a blanking period is extracted from the 10-bit data transmitted corresponding to a pixel clock, the data enable signal (DE) is outputted as Low, and a right blanking signal is generated from three channels of channels 0-2. Moreover, based on 10 bit data transmitted, decoders 51-53 generate 2 bits of S0-S3, output a decoder 53 as HSYNC and a VSYNC, and output 1 bit of a decoder 51, and 2 bits of a decoder 52 to the majority processing section 55. In addition, the remaining 1

bits are outputted as CTL3.

[0024] In drawing 6 , 10 bit data are transmitted in order of code S0 ->S1 ->S3 ->S1 shown in drawing 4 , 0->1->1->1 is obtained by bit0 based on these 10 bit data, and 0->0->1->0 is obtained in bit1. By this bit string, for example, the audio data which are superposition data can be obtained. In addition, by the channel 1, CTL0 and bit1 are treated as CTL1 in bit0 from CTL0/CTL1 being assigned, for example. Moreover, by the channel 2, CTL2 and bit1 are treated as CTL3 in bit0 from CTL2/CTL3 being assigned, for example. In addition, with the gestalt of this operation, in CTL0-CTL3, the data same about three are sent and reduction of an error rate is aimed at. Therefore, in order to, send the same data as CTL0/CTL1 for example, the 10-bit CTRL code based on codes S0 and S3 will be sent out through a channel 1 from a sending area.

[0025] Drawing 7 (a) - (d) is drawing for explaining the 1st majority art carried out in the majority processing section 55. Drawing 7 (a) and (c), By (d), "Erase" shows the part which is not a blanking signal and it can be interpreted as this part of data being lost. That is, "Erase" is outputted when the decoder of each channel is not in agreement with the bit string of Ri and a blanking signal. In the majority processing 61, the number of "1" of a triplet and the number of "0" which are obtained from the outputs R1 and R2 of decoders 52 and 53 are compared, and the direction with much number is considered as a bit output. At this time, the symbol of "Erase" is not included in the number. For example, the repeat as shown in drawing 7 (b) should be obtained as an example of a triplet repeat. The number of 2 and "1" is set to 1 by the number of "0" at this time, and since there is "many 0", "0" is obtained as an output Sout of the majority processing 61. Moreover, the repeat as shown in drawing 7 (c) should be obtained as an example in case there is "Erase." At this time, the number of 0 and "1" is set to 1 except for the symbol of "Erase" of R1 by the number of "0." Since there is "many 1" as a result, "1" is obtained as an output Sout of the majority processing 61.

[0026] Next, the repeat as shown in drawing 7 (d) should be obtained as other examples in case there is "Erase." At this time, "0" and "1" may become the same number except for the symbol of "Erase" of R2. Since it is clear that transmit data's what was continuation of "0" and "1" transformed itself on the way, from assignment of the code shown in drawing 4 , a soft decision is carried out and it outputs to the smaller one of the Hamming distance, respectively. In the case of S2, since both the Hamming distance of S0 and S2 and the Hamming distance of S1 and S3 are as small as 1 and the other Hamming distance is as large as 9 or 10, "0" is obtained as an output Sout of S061, i.e., majority processing, and when it is S1, "1" is obtained as an output Sout of S361, i.e., majority processing. When all are "Erase", as an output Sout, either "1" or "0" is OK.

[0027] Drawing 8 is drawing for explaining the 2nd majority art carried out in the majority processing section 55. Here, after the Hamming distance chooses a near

thing in addition to the majority processing 61 explained by drawing 7 (a) – (c), the description is in the point of having formed the Hamming majority processing 62 in which majority was taken. That is, from each decoders 52 and 53, in "Erase", symbol R'i of min [Hamming distance / with the bit string assigned to each symbol to the bit string which received] is outputted at coincidence, and the judgment based on this Hamming distance is taken into consideration. The bit string by which the "Hamming distance" was received here takes out a different bit from an original bit string, the number is shown, and whenever [coincidence] will become low if whenever [coincidence] is high when a number is small, and a number is large. In each decoders 52 and 53, the comparison with the bit string inputted as four CTL codes applicable to codes S0–S3 is performed, and the code R'1 whose Hamming distance was small, and R'2 are outputted. In the Hamming majority processing 62, what has many number of R'1 outputted by each decoders 52 and 53 and "1" of the bit to which R'2 corresponds and number of "0" is outputted.

[0028] That is, at the 2nd majority art shown in drawing 8 , when all are "Erase", and when the number of "1" and "0" is the same number, except, the same value as the 1st majority art shown by drawing 7 (a) – (c) is outputted, and the result of the majority processing 61 is obtained as Sout. When the output from the Hamming majority processing 62 cannot be set to Sout using code R'i when all are "Erase", and when the number of "1" and "0" is the same number (when data are actually lost), and data can be determined as neither, the time of data being lost can be assisted.

[0029] Drawing 9 (a) and (b) are drawings for explaining the 3rd majority art carried out in the majority processing section 55. Weighting deduced from the probability mistaken by this 3rd majority art to the Hamming distance outputted from each decoders 52 and 53 to the 2nd majority art shown in drawing 8 is multiplied and calculated. As shown in drawing 9 (a), from each decoders 52 and 53, symbol R'i and the Hamming distance di of min [Hamming distance / with the bit string assigned to each symbol] are outputted to all bit strings. In the majority processing 63, information as shown in drawing 9 (b) is held. That is, the multiplier Wjd decided based on the probability for each bit j of Hamming distance d and the selected symbol to be an error is defined beforehand, and is prepared. This multiplier Wjd is set up so that it may become small, as it becomes max and the Hamming distance usually becomes large, when the Hamming distance is 0.

[0030] In the majority processing 63, to the multiplier Wjdi determined by the acquired Hamming distance di, when the bit of each symbol is "1", it is referred to as positive–number Wjdi, and when each bit is "0", the sum is calculated to all the received bits as negative–number–Wjdi. From the majority processing 63, when the count result is a positive number, "1" is outputted, and when it is negative, "0" is outputted.

[0031] Drawing 10 (a) – (d) is drawing for explaining the example of count by the 3rd majority art shown in drawing 9 (a) and (b). Here, the value as shown in drawing 10 (a) should be acquired as symbol R'i inputted into the majority processing 63, and the

value as shown in drawing 10 (b) as the Hamming distance di shall have been acquired. Moreover, the value shown in drawing 10 (c) shall be defined as a multiplier Wjd of weighting. Concrete count is shown in drawing 10 (d). Since the Hamming distance of "d1" is "4" as first shown in drawing 10 (b), the multiplier Wjd obtained from drawing 10 (c) is set to "2" in a bit 0, and is set to "1" in a bit 1. As the symbol R'1 shown in drawing 10 (a), since a bit 0 is "0" and a bit 1 is "0", "2" and "1" become a negative number, and "−2" and "−1" are obtained. Similarly, "+32" is obtained from a symbol R'2 and the Hamming distance d2. At this time, since it is not used by the repeat, a bit 1 is excepted. These sums are set to "29", it is larger than "0" and the output Sout from the majority processing 63 can obtain "1." Thus, in this 3rd majority art, a near thing can improve an error rate greatly compared with simple majority by judging based on weighting based on in what kind of probability it generates.

[0032] Drawing 11 is drawing having shown relation with the data error in the actually received symbol to the error of a transmission line. The axis of abscissa of drawing shows the value of an error of a transmission line, and the axis of ordinate shows the value of an error of the data contained in the output to receive. In drawing 11 , ** with which CTL0 and CTL1 are the cases where it is transmitted as it is, and they indicate each CTL to be to drawing − ** show the result of having used the majority processing in the gestalt of this operation. ** The 1st majority art and ** which were mentioned above show the 2nd majority art, ** shows the 3rd majority art, and the weighting is a value as shown in an upper right Fig. Here, weighting is determined about three, CTL0, CTL1, and CTL2 to which the same superposition data are sent. Thus, he can understand that the error of the data outputted multiple times and by sending in the same superposition data improves like ** − ** compared with the case where superposition data are sent independently. moreover, majority is only taken −− "−− ** −− compared with 1st majority art", when a judgment can call it neither by majority because of "Erase", it judges as the minimum symbol of distance −− "−− ** −− it becomes possible to boil an error rate markedly and to reduce it by 2nd majority art." furthermore, it judges flexibly by weighting of distance −− "−− ** −− the improvement effect of an error rate can be made higher by adopting 3rd majority art."

[0033]

[Effect of the Invention] As mentioned above, as explained in full detail, according to the data transmission approach of this invention, the error of addition data reception can be reduced. Moreover, according to the receiving set of a video data with which this invention is applied, circuitry can be simplified and the improvement of an error rate to superposition data can be aimed at.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing having shown an example of the digital video signal transceiver system by which the gestalt of this operation is applied.

[Drawing 2] It is drawing for explaining the configuration of the transmitting section 30.

[Drawing 3] (a) and (b) are drawings for explaining DVI transmission timing.

[Drawing 4] It is drawing for explaining assignment of the code in the gestalt of this operation.

[Drawing 5] It is drawing for explaining the configuration of a receive section 50 shown in drawing 1 .

[Drawing 6] It is a timing chart for explaining decision by the receive section 50 to the data of 10 bit strings sent.

[Drawing 7] (a) and (b) are drawings for explaining the 1st majority art carried out in the majority processing section 55.

[Drawing 8] It is drawing for explaining the 2nd majority art carried out in the majority processing section 55.

[Drawing 9] (a) and (b) are drawings for explaining the 3rd majority art carried out in the majority processing section 55.

[Drawing 10] (a) – (d) is drawing for explaining the example of count by the 3rd majority art shown in drawing 9 (a) and (b).

[Drawing 11] It is drawing having shown relation with the data error in the actually received symbol to the error of a transmission line.

[Description of Notations]

8 [-- Front end,] -- An antenna, 9 -- Rhine, 10 -- A digital tuner, 11 12 -- AV (Audio Visual) decoder, 20 -- Monitor, 21 -- A D/A converter, 22 -- Amplifier (RGB AMP), 23 -- Level Vertical Synchronizing signal (H/V SYNC), 24 [-- Transmitting section,] -- CRT, 25 -- A D/A converter, 26 -- A loudspeaker, 30 31, 32, 33 -- An encoder, 34 -- A buffer, 35 -- Timing generation section, 36 -- PLL (Phase-Locked Loop), 37 -- DDC (Display Data Channel), 50 -- A receive section, 51, 52, 53 -- A decoder, 54 -- Blanking signal generation section, 55 [-- The timing generation section, 59 / -- EDID (Extended Display Identification Data), 61 / -- Majority processing, 62 / -- The Hamming majority processing, 63 / -- Majority processing] -- The majority processing section, 56 -- A buffer, 57 -- PLL, 58